angles. Now if Professor Matz can *prove* that there *are any* right-angled triangles having the hypotenuse a besides those obtained by varying one leg uniformly from 0 to a, I—would like to see the proof. How *can* there *be* any other triangles, if we have a leg for *every possible* value from 0 to a?

III. I will pass over the first and second paragraphs of the Editor's "Reply." In regard to the third paragraph I deny that any triangles *can* be interpolated, and demand proof. If one leg takes *all possible* values from 0 to a, every triangle has been included and there *can not* be any other.

IV. My solution, which I desire to reproduce here, is as follows:

Let x denote one leg of any one of the triangles, then $\sqrt{(a^2-x^2)}$ will denote the other leg. The area of this triangle is $\frac{1}{2}x\sqrt{(a^2-x^2)}$, and the true average of this is

$$\int_0^a \tfrac{1}{2}xdx\sqrt{(a^2-x^2)} \div \int_0^a dx, =\tfrac{1}{6}a^2.$$

V. I think I have considered and fully refuted every objection that has been raised against my solution.

Correction.—Vol. II., page 371, for "p. 82" read p. 282.

MISCELLANEOUS.

Conducted by J. M. COLAW, Monterey, Va. All contributions to this department should be sent to him.

SOLUTIONS OF PROBLEMS.

35. Proposed by WILLIAM SYMMONDS, A. M., Professor of Mathematics and Astronomy in Pacific College, Santa Rosa, California; P. O., Sebastopol, California.

To an observer whose latitude is 40 degrees north, what is the sidereal time when Fomalhout and Antares have the same altitude; taking the Right Ascension and Declination of the former to be 22 hours, 52 minutes, —30 degrees, 12 minutes; of the latter 16 hours, 23 minutes, —26 degrees, 12 minutes?

II. Corrected solution by JOHN M. ARNOLD, Crompton, Rhode Island; and Prof. G. B. M. ZERR, A. M., Ph. D., Texarkana, Arkansas-Texas.

Let λ=latitude of observer, α, δ, α_1, δ_1 the Right Ascension and Declination of Fomalhout and Antares, respectively, β=altitude, h, h_1 the hour angles.

This event can happen only when Antares is west and Fomalhout east of the meridian.

$$\therefore \left.\begin{aligned}\sin\beta&=\sin\lambda\sin\delta+\cos\lambda\cos\lambda\cos h\\&=\sin\lambda\sin\delta_1+\cos\lambda\cos\delta_1\cos h_1\end{aligned}\right\} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(1).$$

$$\alpha-h=\alpha_1+h_1, \text{ or } h+h_1=\alpha-\alpha_1 \quad\ldots\ldots\ldots\ldots\ldots\ldots(2).$$

But $\lambda=40°$, $\alpha=343°$, $\alpha_1=245°\ 45'$. $\delta=-30°\ 12'$, $\delta_1=-26°\ 12'$.

$\therefore$ $662065\cos h-687337\cos h_1=39538$ ....(3).

$$\cos(h+h_1)=\cos 97°\ 15'=-.12620\ldots\ldots\ldots\ldots\ldots\ldots(4).$$

Let $\cos h=x$, $\cos h_1=y$. From (4) $y=-.12620x\pm.992005\sqrt{1-x^2}$. This in (3) gives, $748806.9294x\mp681841.7407\sqrt{1-x^2}=39538$.

$\therefore$ $x^2-.057736x=.451771$. $\therefore$ $x=.701626$ or $-.643890$.

$\therefore$ $h=45°\ 26'\ 31''$ or $130°\ 4'\ 57''$. The first value of h gives h_1 positive.

$\therefore$ $h=3$ hours, 1 minute, 46 seconds.

$\therefore$ sidereal time$=\alpha-h=19$ hours, 50 minutes, 14 seconds.

37. Proposed by F. M. SHIELDS, Coopwood, Mississippi.

A gentleman owned and lived in the center, R, of a rectangular tract of land whose diagonal, D, was 350 rods, dividing the tract into two equal right-angled triangles, in each of which is inscribed the largest square field, F and F_1, possible; the north and south boundary lines of the two square fields being extended and joined formed a little rectangular lot, R, in the center around the residence. The difference in the area of the *entire rectangular* tract and the *sum* of the areas of the two square fields, F, F_1, is $187\frac{1}{2}$ acres. Give the dimensions and area of the entire tract, and one of the square fields, F or F_1.

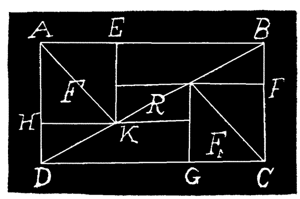
I. Solution by G. B. M. ZERR, A. M., Ph. D., Professor of Mathematics and Applied Science in Texarkana College, Texarkana, Arkansas-Texas.

Let $AB=a$, $AD=b$, $AH=x$. $\therefore$ $a^2+b^2=122500$ ....(1).

$ab-2x^2=187\frac{1}{2}$ acres$=30000$ square rods...(2).

$ax+bx=ab$ ....(3),

from triangles BAD and BEK.



From (3) $x^2(a^2+2ab+b^2)=a^2b^2$ ....(4).

(1) and (2) in (4) gives $62500x^2=900000000$.

$\therefore$ $x^2=14400$ square rods$=90$ acres.

$\therefore$ $x=120$ rods.

$\therefore$ $ab=58800$ square rods$=367$ acres.

$\therefore$ $a+b=490$ rods. $a-b=70$ rods. $\therefore$ $a=280$, $b=210$.

II. Solution by ISAAC L. BEVERAGE, Monterey, Virginia.

If $a=AB$ and $b=AD$, then ab=area of entire farm. Now $ab/(a+b)=AH$, since it is the side of an inscribed square of a triangle.

$\therefore$ $[ab/(a+b)]^2$=the area of F or F_1. Hence, we readily obtain,

$$ab-2[ab/(a+b)]^2=187\tfrac{1}{2}\times160\ldots\ldots\ldots\ldots\ldots\ldots(1),$$

$$\text{and } \sqrt{a^2+b^2}=350\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(2).$$